Third Ventriculostomy in Obstructive Hydrocephalus

Long-Term Arrest of Hydrocephalus in 4 Cases

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The current most popular form of treatment of infantile hydrocephalus is a ventriculo-venous or ventriculo-atrial shunt, using either a Holter or Pudenz shunt valve assembly. In 2 recent reviews\(^3,4\) the indications, results and complications of the various operations (past and present) for hydrocephalus have been thoroughly discussed. One of us (HCV) in 1951\(^5\) suggested the use of 3rd ventriculostomy as originally advised by Dandy for the treatment of obstructive hydrocephalus associated with spina bifida and myelo-meningocele. Cohen\(^1\) had earlier reported a case of 3rd ventriculostomy in which the opening into the 3rd ventricle had been found patent 15 years after operation. In the paper by Voris\(^3\) reference was made to 10 patients in whom the results were considered good. The period of observation at that time ranged from 6 months to 4 years.

An attempt has been made to follow up these 10 patients as well as 2 others operated on a short time later. Five patients could not be traced. Of the remaining 7, 3 were known to have had recurrence of hydrocephalus and 2 of these are dead. One died 2 years after operation, the other 5 years postoperatively.

Follow-up Reports

There were 4 patients in whom hydrocephalus was considered to remain arrested after operation. The first of these, L.O., had been operated on at the age of 8 months, 4 years before the report of 1951. She was last seen in 1954. At that time she was 8 years old, in the 3rd grade, walking with crutches and long-leg braces. She had satisfactory bowel and bladder control. Her head circumference was 58 cm.

L.H., had been operated on 1 year before the 1951 report, when she was 5 months old. She was last seen 11 years after operation. At that time she was 11 years old, in 6th grade. She was 46 inches tall and weighed 54 pounds. She could hop on either foot and walk on her toes but not on her right heel. The right lower extremity was 3 cm. shorter than the left and the circumference of the right calf was 4 cm. less than the left.

D.H. was operated on when 1 month old, 2 years prior to the 1951 report. She was last seen in November, 1964, at the age of 15. She was 51 inches tall and weighed 101 pounds following strenuous weight reduction. This girl can walk with braces and crutches since weight reduction and can swim 25 yards. She is in Junior High School. She has had convulsive seizures since her operation but these are satisfactorily controlled by medication.

P.B., the 4th patient, was operated on 2 years before the 1951 report when he was 15 days old. He is the only male in this group of good results and the only child to have 3rd ventriculostomy as the initial operative procedure. This boy had an occipital cranium bifidum with an encephalo-meningocele. His head did not enlarge significantly but his development was retarded. When he was a year old a dye test demonstrated obstruction between the lateral ventricle and the lumbar subarachnoid space and a ventriculogram revealed moderate enlargement of the ventricles.

This boy was last seen in July, 1964. He did not talk and had never gone to school. He was small and neatly dressed. He was said to have good sphincter control. He had never had a convulsive seizure. There was mild generalized spasticity and incoordination with mild ataxia. The subtemporal decompression was flat. Psychological tests were reported to show an I.Q. of 37 and a mental age of 5 years.

Discussion

The 4 children reported here have been observed from 7 to 15 years after 3rd ventriculostomy for obstructive hydrocephalus associated with lumbar spina bifida and myelomeningocele in 8 patients and occipital cranium bifidum and encephalo-meningocele in 1. All 4 patients are physically well today. Obesity has been a severe problem in 1; this patient also has convulsive seizures. One patient with encephalomeningocele is severely retarded, the other 3 were progressing normally in school at the time of their last report.

At the time of the 1951 report, 10 children were said to be doing well. At this time we can account for the 4 children that have been reported here. 8 others have been followed to their death or until they have had obvious recurrence of hydrocephalus. A number of patients operated on (especially at the Cook County Hospital) were not seen after they left the hospital. It is likely that many of these had recurrence of hydrocephalus.

Evaluation of an operative procedure for infantile hydrocephalus demands a long term follow-up. We believe that measurement of growth of the head by itself is an inadequate means of evaluation. Ventricles may gradually enlarge with corresponding damage to the so-called cerebral mantle even though the head size is not increasing (patient P.B.). In other words, the brain is more susceptible to chronic low grade increased intracranial pressure than is the fontanelle membrane and cranial suture lines. None of the patients that

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have had 3rd ventriculostomy have shown the
dramatic depression of the fontanelle and decrease
in head circumference that follows successful
shunt operations.

Third ventriculostomy by the temporal ap-
proach deserves consideration in the treatment of
obstructive hydrocephalus in infants or very
young children. As originally pointed out it
should be reserved for those patients who have
obstruction of the ventricular system and in whom
there is no evidence of obstruction of the basilar
sub-arachnoid cisterns. It can now be stated
that it should only be used for patients in whom
ventriculo-venous or ventriculoatrial shunts have
failed. Patients who have had third ventriculos-
tomy should be carefully followed. Unless there is
clear evidence that increased intracranial pressure
is remaining low, ventriculography should be per-
formed to determine whether the ventricles are
enlarging.

References
1. Cohen, I. Third ventriculostomy proven patent
2. Scarff, J. E. Treatment of hydrocephalus: an
historical and critical review of methods and results.
3. Voitis, H. C. Third ventriculostomy in treatment of
4. Yashton, D. Progress in infantile hydrocephalus. J.